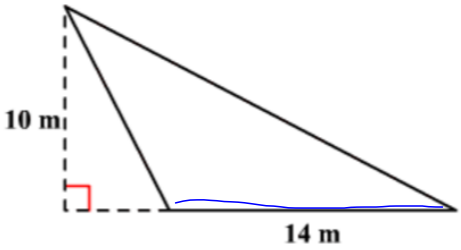
6.1 - 6.2 Extension - Find the Area of Oblique Triangles

1.) Find the area of the triangle.

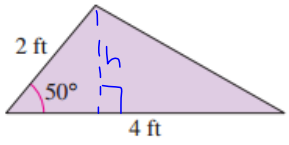


$A = \frac{1}{2}bh$

$A = \frac{1}{2}(14)(10)$

$A = 70\ m^2$

2.) Find the area of the triangle.



$\sin 50° = \frac{h}{2}$

$h = 2\sin 50°$

$A = \frac{1}{2}bh$

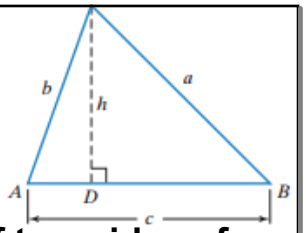
$= \frac{1}{2}(4)(2\sin 50°)$

$A = 3.06\ ft^2$

Area of a Triangle

$$\Delta \text{ Area} = \frac{1}{2}b\sin A = \frac{1}{2}ac\sin B = \frac{1}{2}ab\sin C$$

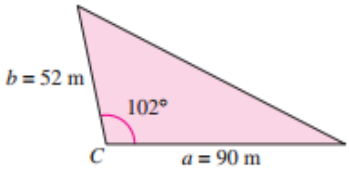
base



Use this formula when given the measurements of two sides of a triangle and the included angle.

$A = \frac{1}{2}ab\sin C$

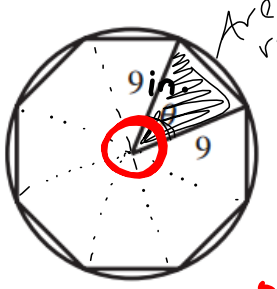
3.) Find the area of the triangle.



$A = \frac{1}{2}(90)(52)\sin 102^\circ$

$2288.87\ m^2$

4.) Find the area of a regular octagon inscribed in a circle with radius of 9 inches.



Area of regular octagon = 8 (area of triangle)

$= 8\left(\frac{1}{2}(9)(9)\sin 45^\circ\right)$

$= 8\,(28.64)$

$A = 229.10\ in^2$

$\theta = \frac{360^\circ}{8}$

THEOREM Heron's Formula

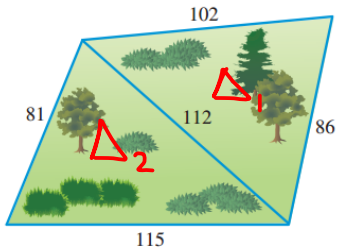
Let a, b, and c be the sides of ΔABC, and let s denote the **semiperimeter**.

$$(a + b + c)/2.$$

Then the area of ΔABC is given by Area $= \sqrt{s(s-a)(s-b)(s-c)}$.

5.) Use Heron's Formula to find the area of the land.

8475.74 yd²



Δ_1

$s = (112+86+102) \div 2 = 150$ yd

$A_{\Delta_1} = \sqrt{150(38)(64)(48)}$

$A_{\Delta_1} = 4184.54$ yd²

Δ_2

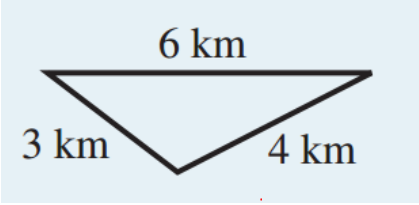
$s = (81+115+112) \div 2$

$s = 154$ yd

$A_{\Delta_2} = \sqrt{154(73)(39)(42)}$

$A_{\Delta_2} = 4291.20$ yd²

6.) Because deer require food, water, cover for protection from weather and predators, and living space for healthy survival, there are natural limits to the number of deer that a given plot of land can support. Deer populations in national parks average 14 animals per square kilometer. If a triangular region with sides of 3 kilometers, 4 kilometers, and 6 kilometers has a population of 50 deer, how close is the population on this land to the average national park population?



$s = (3+6+4) \div 2 = 6.5 \text{ km}$

$A = \sqrt{6.5(3.5)(2.5)(0.5)} \approx 5.33 \text{ km}^2$

$\frac{50 \text{ deer}}{5.33 \text{ km}^2} \approx 9.38 \text{ deer/km}^2$

less than national average